

**Notice of Allowability**

Application No.

10/733,431

Examiner

Evan Pert

Applicant(s)

BERNE ET AL.

Art Unit

2826

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the papers filed April 23, 2004.
2. ☒ The allowed claim(s) is/are 1-23.
3. ☐ The drawings filed on \_\_\_\_\_ are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some\* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date <u>0404</u> | 7. <input type="checkbox"/> Examiner's Amendment/Comment                               |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material                           | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|  | 9. <input type="checkbox"/> Other _____.   |

**DETAILED ACTION**

***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Drawings***

2. Figures 6 and 7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

Applicant is required to add "Prior Art" or "Conventional Art" to each of Figures 6 and 7 by submitting "corrected drawings."

Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures.

***Allowable Subject Matter***

3. Claims 1-23 are allowed.
4. The following is an examiner's statement of reasons for allowance:

The prior art does not disclose applicant's method characterized by annealing the source-handle-structure (i.e. the source substrate bonded to a handle substrate while not yet detached) in multiple annealing steps wherein a first annealing step is conducted at an energy level lower than that of the thermal detachment budget, and a second annealing step is conducted at a second energy level lower than the first level, to at least prepare for detachment of a useful layer.

Importantly, the “first” and “second” annealing steps are temporally “first” and “second” (i.e. the “first” is conducted before the “second”), as interpreted in accordance with the written description.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

The article entitle “SOI: Materials to Systems” to A.J. Auberton-Herve is cited for an early summary of the SMART CUT process, wherein “thermal activation” is used to cut away (i.e. detach) at a cleavage plane defined by hydrogen ion implantation, but the thermal activation is a single annealing step, contrary to applicant’s claimed method.

The reference entitled “Low Temperature Si Layer Splitting” is cited for using a multiple annealing to lessen the time required to separate a bond at 200°C, with the pre-anneal being 250°C, yet the pre-anneal is on the unbonded handle and source substrates, not of the bonded pair as claimed by applicant.

The reference entitled “Semiconductor Wafer Bonding: A flexible approach...” to Gosele et al. is cited for disclosure of an investigation of annealing time versus temperature, to form blisters from hydrogen gas, which is indicative of time to detach in the “smart cut” of the SMART CUT process.

US 6,632,724 to Henley et al. is cited for discussion of controlled cleaving action with an expanding cleave, but does not suggest the kind of multiple annealing steps claimed by applicant.

US 6,828,216 to Schwarzenbach et al. is cited for disclosing a controlled temperature profile over time where annealing occurs in multiple stages over time, yet the second heating is at a greater rate and higher temperature, contrary to applicant's claimed method.

US 6,838,358 to Maurice et al. is cited for disclosing a method of applying a first annealing at a temperature that does not cause detachment, followed by annealing indirectly with heat from photons at an effectively lower energy than the first heating, to prepare for detachment, yet does not qualify as "prior art" in view of the filing date.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ETP  
April 28, 2005

  
**EVAN PERT**  
**PRIMARY EXAMINER**